REMARKS

The independent claims 17, 30 and 37 stand rejected under 35 USC 103 over Schofield in view of Faivre et al. Applicant respectfully traverses.

The present invention, as defined in claim 17, is concerned with a flotation cell (designated 11 in the embodiment shown in the drawings) including a structure defining an outlet opening for discharging concentrate from the flotation cell. In this regard, it will be understood by those skilled in the art that the term "flotation cell" has a specific meaning to those skilled in the art and refers to an apparatus that is used for separating components of minerals and comprises a tank having a slurry inlet, a slurry outlet, and a rotor mounted in the tank. Rotation of the rotor in the tank creates air bubbles which form a froth on the surface of the slurry in the tank. The froth is discharged from the tank through a froth outlet. The surface liquid of the bubbles in the froth contains a higher concentration of minerals than the liquid below the froth. The "outlet opening" recited in claim 17 corresponds to the froth outlet of the flotation cell.

In accordance with claim 17, the flotation cell includes a flow measuring arrangement for measuring concentrate flow through the outlet opening. The flow measuring arrangement comprises an elongate sensor element (designated 1 in FIG. 1) that is mounted relative to the structure defining the outlet opening in a manner that allows movement of the sensor element under the influence of flow of concentrate through the outlet opening. The sensor element has a length dimension sufficient that the sensor element extends over substantially the entire vertical dimension of the outlet opening and has a width dimension that is parallel to the horizontal dimension of the outlet opening and is substantially less than the horizontal dimension of the outlet opening. A measuring device (designated 2) detects the position of the sensor element.

Claim 30 is in many respects similar to claim 17 except that it recites that the flow measuring arrangement includes a horizontal shaft (designated 3), the sensor element is a rod that is attached to the horizontal shaft, and the measuring device is an angle transmitter for measuring deflection of the sensor element.

Claim 37 is similar to claim 17 except that it recites positively that the elongate sensor element is a rod.

Schofield discloses a device for measuring the flow of liquid through a pipe or duct, specifically as related to sewage systems. The device functions by measuring the angular displacement of an impact plate or flap 14 that is placed over the outlet opening 13 of a sewage pipe 12 and displaced when liquid flows through the pipe 12 and out of the outlet opening 13. The amount of displacement is a direct function of the rate of flow of liquid through the pipe. Schofield goes on to disclose that in order for the device to function correctly a specific shaped flap is needed. Schofield teaches that the lower edge of the flap should contact the highest point on the liquid surface, regardless of the level of the liquid surface. Schofield shows that the shape of the liquid surface, and hence the location of the highest point, depends on the level of the liquid surface. Thus, at a low flow rate, the lower edge of the flap contacts the liquid surface at the center of the stream whereas at a higher flow rate, the lower edge contacts the liquid surface at the edges of the stream (see FIGS. 7, 9 and 11). In order for the lower edge of the impact plate to contact the liquid surface at the edges of the stream, the width dimension of the impact plate must be substantially the same as the horizontal dimension of the outlet opening 13.

Faivre et al discloses a device for measuring the clean yield of an agricultural crop that is being somehow conveyed, for example by the clean grain elevator of a combine. Lacking the device of Faivre et al, a combine conveys grain, or some other agricultural product, vertically using paddles in the combine's clean grain elevator. The grain is then transferred to some type of storage unit, such as a bag or bin. During the transfer process the clean yield product separates from the paddles and is "propelled by centrifugal forces forwardly and upwardly" (column 8, lines 15-16) from the top of the clean grain elevator and is deflected off the elevator's shroud and falls in to the storage unit. An actuating arm 102 is mounted to the shroud of the clean grain elevator and positioned such that a portion of the clean yield product traveling from the elevator paddles to the storage unit will come into contact with the actuating arm 102 and thus cause a stress on the arm 102. The actuating arm is connected to a load cell 100, which "acts as a differential bending beam" (column 8, line

24). This structure produces an output signal that is representative of the stress difference between two points on the actuating arm. Thus the clean yield of the agricultural crop is measured by the stress put on the actuating arm. In order for this device to not significantly interfere with the normal function of the combine, Faivre specifically teaches that the actuating arm have a horizontal dimension that is both uniform for the vertical length of the actuating arm, and considerably smaller than the width of the flow of the clean yield product (column 9, lines 13-31).

The examiner has argued extensively in support of the rejection and in response to applicant's arguments in the reply to the previous Office Action. The examiner's arguments do not, however, address all the issues. Furthermore, applicant submits that in at least one important point the examiner's argument is incorrect.

The examiner's arguments in support of the rejection under 35 USC 103 do not refer to a flotation cell or otherwise support the position that Schofield or Faivre et al discloses a flotation cell. As noted above, the term "flotation cell" has a meaning that is well understood in the art and the recitation in the independent claims of a flotation cell inherently calls for several structural features. Since the examiner has not asserted that either Schofield or Faivre et al discloses a flotation cell, an essential element is missing from the rejection and therefore the rejection must be withdrawn.

Applicant further submits that it would not have been obvious to a person of ordinary skill in the art to modify the impact plate 14 shown by Schofield by providing it with a width dimension that is substantially less than the horizontal dimension of the opening at the outlet 13 of the pipe 12. Regardless of the examiner's hindsight view of the disclosure of Schofield, Schofield in fact discloses that the impact plate should detect the top of the surface of the liquid flowing from the outlet 13. See, for example, the paragraph starting at page 1, left column, line 52 and the paragraphs starting at page 2, left column, lines 57 and 73. Thus, Schofield teaches that depending on the flow rate through the pipe 12, the top surface of the liquid flow will be strongly convex at low flow rates, as shown in FIG. 7, less strongly convex at higher flow rates, as shown in FIG. 9, and would have a somewhat M-shaped configuration, as shown in FIG. 11, at high flow rates.

Contrary to the examiner's assertion, FIG. 3 of Schofield tells us nothing about the shape of the impact plate but shows only that the cross-sectional shape of the pipe 12 changes between the location of the section line 3-3 of FIG. 1 and the outlet 13.

Schofield teaches that the impact plate should detect the highest point of the stream of liquid and emphasizes that when the surface of the stream sags at the middle and becomes concave, as shown in FIG. 11, a pointed flap that rides at the center of the stream is not satisfactory. Further, it is not clear that a narrow rod or arm, such as the arm 102 of Faivre et al, would ride on the surface of the stream. This emphasizes the difference in principle of operation of the structures shown by Schofield and Faivre et al respectively. Schofield is concerned with a flow meter in which the impact plate rides on the surface of the liquid that is being measured and ideally does not penetrate the flow whereas Faivre et al discloses apparatus in which the actuating arm 102 intercepts the clean yield product and provides an output based on the stress applied to the arm by the clean yield product. Schofield measures the shape of the stream of liquid by detecting the top of the surface of the stream whereas Faivre et al employs the actuating arm to measure the momentum of the flow.

For the reasons presented above, applicant submits that it would not have been obvious to a person or ordinary skill in the art to modify the flow meter of Schofield by replacing the impact plate 14 with a narrow rod similar to the actuating arm of Faivre et al. Based on the disclosure of Faivre et al, such a substitution would involve positioning the narrow arm so that it penetrates the flow, instead of riding on the surface of the stream, and therefore the arm would not detect the top of the surface of the stream. Applicant therefore submits that claims 17, 30 and 37 are patentable over Schofield and Faivre et al, whether taken singly or in combination. It follows that the dependent claims also are patentable.

The rejection of claims 24, 25, 31, 32, 44 and 45 depends on the rejection of the independent claims being sustained. Since the

independent claims are patentable, it follows that claims 2, 25, 31, 32 44 and 45 are patentable.

Respectfully submitted,

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